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Senior research and development engineer in robotic autonomy & control with focus on practical applications of artificial and computational intelligence for autonomous robotic systems.

QUALIFICATIONS

Over a decade of research experience; proficient technical writer; ability to work effectively on a team or independently; effective team leader; excellent interpersonal skills; adapts easily to new technology; creative, resourceful and success oriented.

EDUCATION

Doctor of Philosophy Electrical Engineering, University of New Mexico, Albuquerque, NM
Concentration: Autonomous Control Engineering and Mobile Robotics, *1996*

Master of Engineering Mechanical Engineering, Howard University, Washington, DC
Concentration: Robotics, *1989*

Bachelor of Science Mechanical Engineering, Howard University, Washington, DC, *1986*

EXPERIENCE

1999 - present ***Senior Member of Engineering Staff,*** Robotic Vehicles Group, Mobility Systems Concept Development Section, Jet Propulsion Laboratory, Pasadena, CA.

Control and navigation researcher developing and implementing algorithms, and field testing autonomous rover systems for planetary surface exploration on several NASA/JPL robotics research tasks.

Lead System Engineer on Field Integrated Design & Operations (FIDO) Testing Task responsible for technical direction of the FIDO rover team of a dozen engineers performing engineering activities associated with rover system integration & test, including end-to-end mission operations system technology. Also responsible for field trial preparation, coordination, and execution aimed at Mars rover mission simulations and training of planetary scientists for remote field exploration using autonomous rover systems.

Cognizant Engineer on Nanorover Technology Task responsible for rover and instrument control software development on miniature research prototype vehicles. Led development and integration of new robotic science vehicle to demonstrate further miniaturization of existing nanorover technology.

Software Engineer on Nanorover Outposts Task developing algorithms and architecture for behavior-based cooperative control of a team of miniature rovers designed for site excavation tasks.

Co-Investigator on Safe Navigation of Planetary Rovers on Challenging Terrain Task developing fuzzy logic control algorithms for safe rover navigation involving integration of survivability and health-based reasoning techniques into terrain-based navigation behaviors.

Flight Project Experience - Provide *flight system engineering* support for the NASA Mars Exploration Rovers Project (launches scheduled for 2003) as a member of the Surface Mission Phase Team (Rover Mobility/Navigation). Develop functional design, test plans, and test procedures with focus on rover autonomous navigation functionality. Coordinate rover testbed and field test logistics for functional verification, validation, and characterization of autonomous navigation capability. Support the mission operations system uplink process by providing rover activity planning expertise and the downlink process by providing rover engineering analysis expertise.

1992 - 1999 ***Member of Engineering Staff,*** Robotic Vehicles Group, Autonomy and Control Section, Jet Propulsion Laboratory, Pasadena, CA.

Control and navigation researcher and software engineer on JPL Nanorover Technology research task. Developed and implemented algorithms for planetary surface exploration by miniature wheeled rovers. Responsible for rover and instrument control software development on research prototype vehicles. Also supported technology development tasks focused on soft computing-based rover navigation and multiple cooperating rovers, including development of related robotics research proposals. Led team of five engineers, from three national laboratories and one university, as architect of a software framework designed for a military urban robot system (a DARPA-sponsored effort).

(1992-1996) Earned Ph.D. as ***JPL Fellow*** with research focus on behavior-based and fuzzy logic control of autonomous robots, as well as design of fuzzy control systems using evolutionary computation techniques. Led mobile robot research team of three graduate and two undergraduate students at UNM. Spearheaded mobile robot research thrust in Electrical and Computer Engineering Department. Managed group of six undergraduate students as Project Leader in mobile robot design, construction, and programming task for international competition organized by AAAI. Received award of Outstanding Graduate Student at UNM for this leadership effort

Flight Project Experience - Developed rover control and navigation software as a *software engineer* for the MUSES-CN Flight Project (launch scheduled for July 2002 to explore a near-Earth asteroid). Supported definition, design, and coding of software for autonomous surface navigation in low-gravity, autonomous resource allocation, automated health monitoring and fault recovery. Development included writing device drivers and low-level interface code for commercial and custom sensors and actuators for robotic vehicles.

1989 - 1992 ***Member of Technical Staff***, Robotic Intelligence Group, Jet Propulsion Laboratory

Participated in research & development for space applications of autonomous mobile robots. Tasks included software and hardware development for navigation, path planning, and manipulation for indoor mobile robot testbeds and six-wheeled rover prototypes including *Robby* and early *Rocky* series of rovers employing the JPL rocker-bogie mobility suspension, on which NASA's Mars Pathfinder Microrover (1997) and Mars Exploration Rovers (2003) are based.

Flight Project Experience: Supported *software engineering & development* efforts for NASA TOPEX/POSEIDON project (launched in 1992 to study Earth's oceans and climate) as part of the ground system science data processing effort. Assisted in the formulation, planning, and implementation of system software requirements and design.

1989 ***Logistics Management Specialist****,* Dept. of the Navy, Naval Supply Systems Command, Washington, DC.

Received advanced training in practical applications of management principles aimed at improving logistics support for the U.S. Navy as member of the Fleet Weapons Support Group. Participated with and assisted specialists in providing integrated logistics support for current Navy weapon systems and in logistics planning for future combat system readiness. Performed independent research leading to development of database management software and improved computer procedures for tracking a myriad of ongoing logistics programs and activities — developments officially acknowledged as significant contributions that helped ensure success of important projects.

1986-1989 ***Research and Teaching Assistant****,* Howard University, Washington, DC.

Developed interactive software package using symbolic computation and artificial intelligence techniques for industrial robot modeling. Areas of research included symbolic generation of manipulator kinematics, dynamics, and position error compensation models. Conducted laboratory and classroom sessions, graded assignments, and tutored dynamics, automatic controls, experimentation, and mathematics.

1985-1988 ***Information Analyst****,* Engineering Information Inc., New York, NY.

Wrote, edited, and indexed abstracts of published technical conference papers and journal articles for indexed volumes cataloging worldwide R&D. Manuscripts covered a variety of engineering disciplines, including mechanical, electrical, civil, mining, and petroleum.

RECENT AWARDS AND HONORS

- NASA Group Achievement Award – Safe Rover Navigation Team (2002)
- JPL Notable Organizational Value-Added (NOVA) Award for Innovation and Improvement (2001)
- NASA/U.S. Dept. of Interior William T. Pecora Group Award - TOPEX/Poseidon Team (1998)
- Best Student Paper Award, NASA Univ. Research Center Tech. Conference, Albuquerque (1997)
- Outstanding Achievement Recognition, National Society of Black Engineers, UNM Chapter (1996)
- Outstanding Graduate Student Award, UNM EECE Dept. (Fall 1996)
- Best Student Paper Award in Robotics, World Automation Congress, France (1996)
- Who's Who in Science and Engineering (1996-1997)
- JPL Minority Fellowship (1992-1996)
- NASA Group Achievement Award - TOPEX GDS Science Data Subsystem (1993)
- NASA Group Achievement Award - Robotic Intelligence Team (1991)
- U.S. Dept. of the Navy (NAVSUPSYSCOM) Official Letter of Appreciation (1989)

COMPUTER SKILLS

Programming languages:

C, C++, LISP, Fortran, Basic, Pascal, MACSYMA, Forth, Assembly, HTML

Operating systems and platforms:

UNIX, VxWorks RTOS, MacOS, MS Windows, Sun & DEC workstations, MIPS RISC, microprocessors and PC interfacing

Computational Intelligence: Fuzzy logic, evolutionary computation, and neural networks

Word Processing:

Microsoft Office, LaTeX typesetting

PROFESSIONAL SOCIETIES & ACTIVITIES

- Institute of Electrical and Electronics Engineers (IEEE), Senior Member
- National Society of Black Engineers (NSBE)
- American Association for Artificial Intelligence (AAAI)
- Sigma Xi Scientific Research Society
- New York Academy of Sciences
- The Planetary Society
- Editorial Board Member: *International Journal of Computers & Electrical Engineering*; (since 2003)
- Associate Editor: *Intelligent Automation and Soft Computing: An International Journal* (since 1994)
  Guest Editor: Special Issue on *Autonomous Control Engineering*, 1997
- Technical Referee/Reviewer: *IEEE Transactions on Robotics and Automation*
  IEEE Transactions on Fuzzy Systems
  IEEE Transactions on Neural Networks
  IEEE Transactions on Systems, Man, and Cybernetics
  International Journal of Intelligent and Fuzzy Systems
  International Journal of Information Sciences
  International Journal of Computational Intelligence
- Committee Member: *World Automation Congress*, 1994, 1996; Exhibits Chair 1998;
  Mini-Symposium Co-Chair 2000
- Conference Co-Editor: *NASA University Research Center Technical Conference*, 1997
- Program Committee Member: *IEEE International Conf. on Robotics and Automation*, 1997
  3rd Annual Genetic Programming 1998 Conference
  Genetic and Evolutionary Computation Conference, 1999
  IEEE International Conference on Fuzzy Systems, 2000

MASTER'S THESIS

Applied Symbolic Computation in Robotics,
Department of Mechanical Engineering, Howard University, August 1989.

Ph.D. DISSERTATION

Adaptive Hierarchy of Distributed Fuzzy Control: Application to behavior control of rovers,
Department of Electrical and Computer Engineering, University of New Mexico, December 1996.

PUBLISHED RESEARCH

Author and co-author of 52 conference papers, 16 refereed journal articles, and 6 book chapters covering topics in modeling, navigation, and intelligent control in robotics and autonomous systems.

REFERENCES Available upon request